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(54) **Mitred corner joint**

(57) Two sides of a hollow aluminium extruded section frame are interconnected by a generally L-shaped connector each leg of which has a wedge-shaped recess (34) cooperating with a wedge (40) which, when assembled within the hollow extrusions, can be forced up the inclined surface (36) of the wedge-shaped recess to become wedged between said inclined surface and a wall of the hollow extrusion. A retainer, e.g. a V-shaped clip may engage between surfaces 38, 44 to hold the wedge in position. Each leg (32) may have two oppositely directed wedges, Fig. 9.

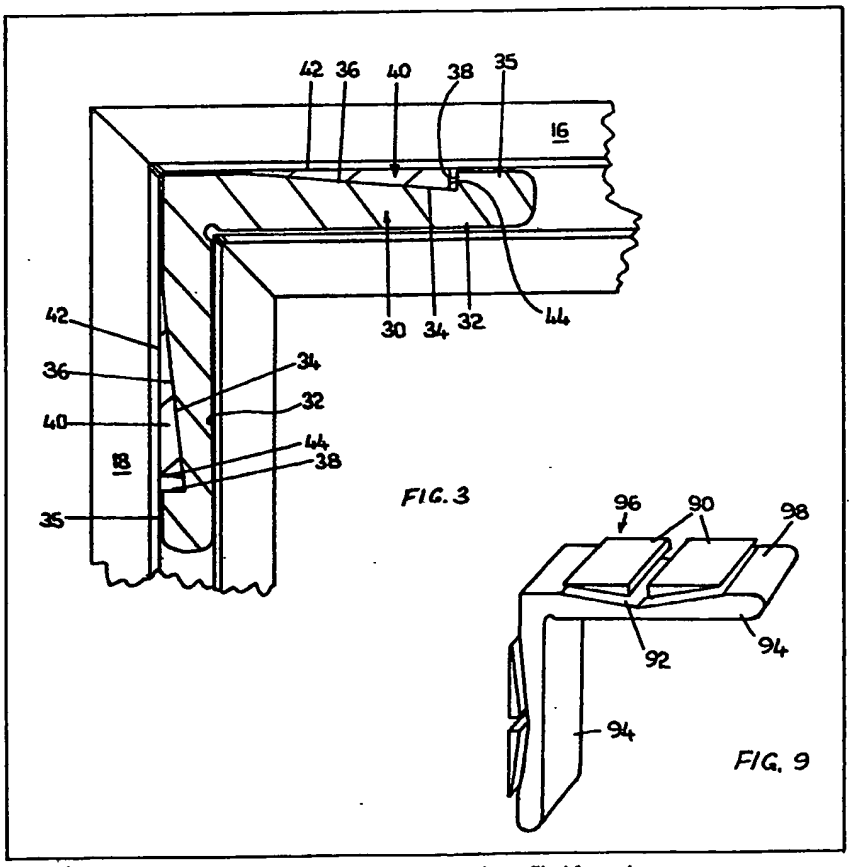

FIG. 3

FIG. 9

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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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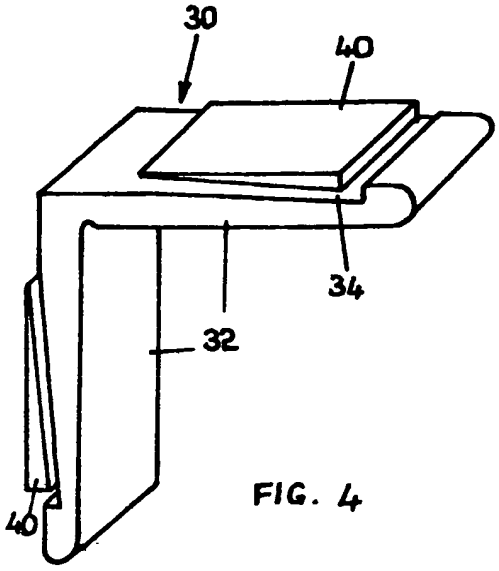

FIG. 4

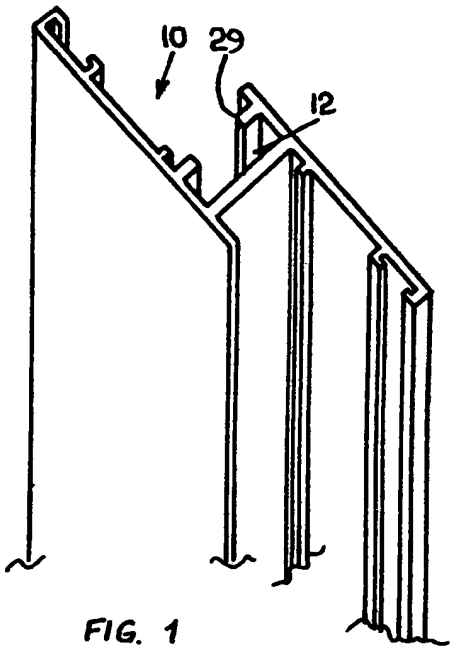

FIG. 1

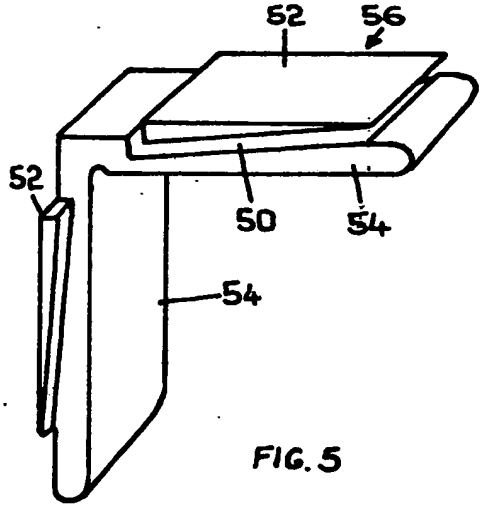

FIG. 5

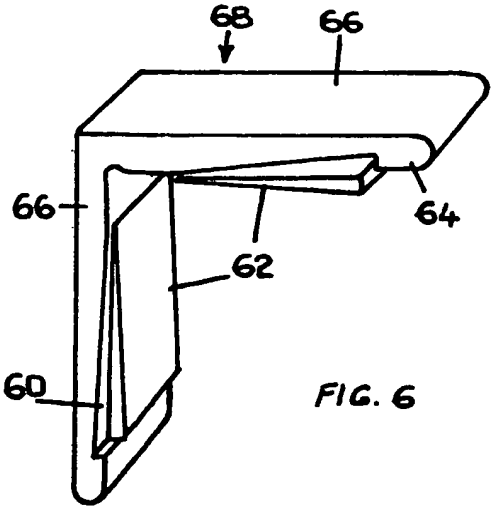

FIG. 6

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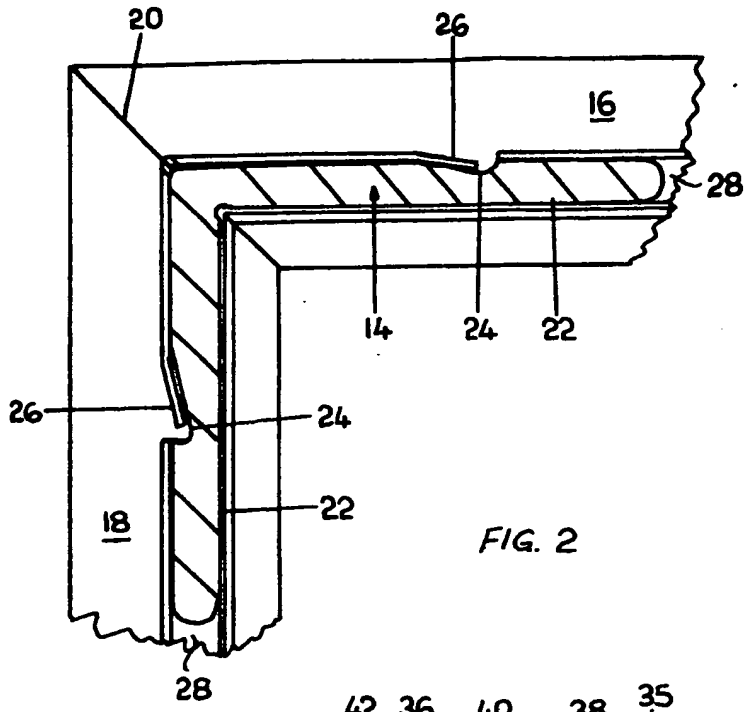

FIG. 2

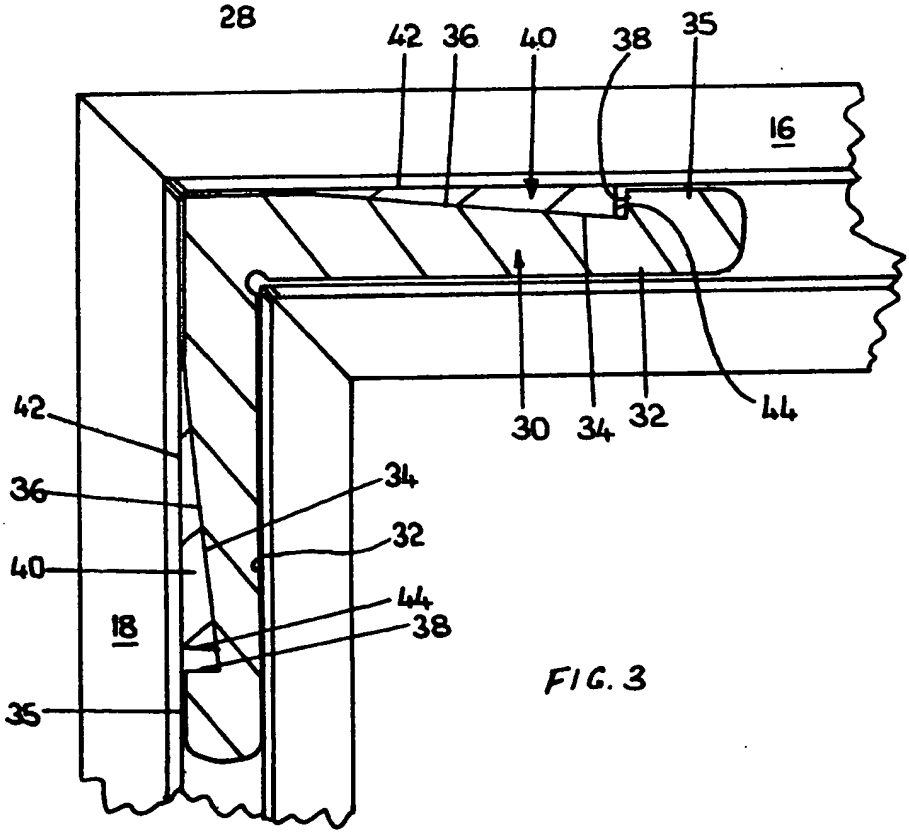

FIG. 3

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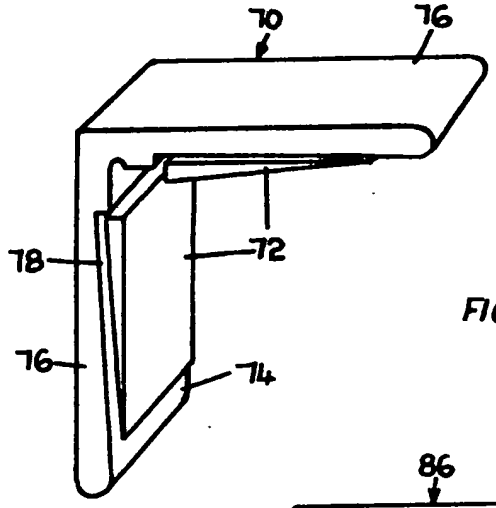

FIG. 7

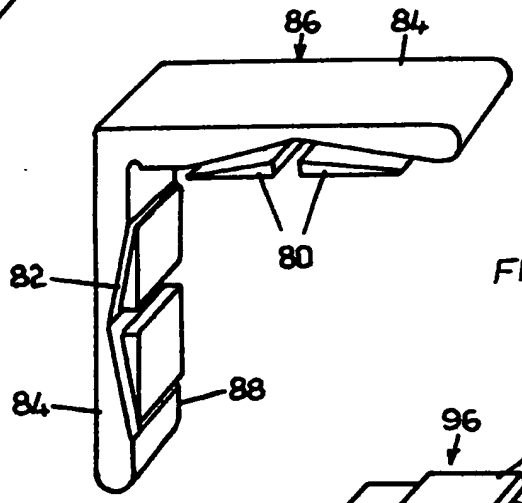

FIG. 8

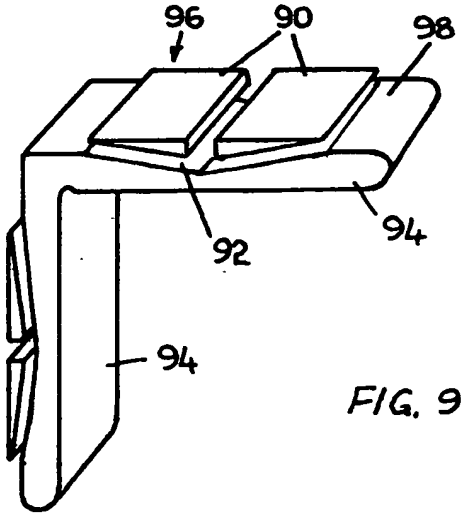

FIG. 9

SPECIFICATION

Improvements in or relating to corner cleats

Field of the Invention

This invention relates generally to corner cleats, and more particulary to corner cleats intended to fix together two hollow extrusions which abut at a mitred corner, e.g. two aluminium extrusions forming part of a window frame, window, door frame or door or the like.

Background to the Invention

The sides of aluminium window frames and like hollow extrusions are normally fixed together in an assembled condition by use of corner cleats.

A conventional corner cleat is assembled within the hollow section of two extrusions which abut at a mitred corner, such cleat having two angled legs (perpendicular to one another for a right-angled corner) which extend within and along longitudinal channels incorporated in the hollow sections of the extrusions. Each leg of the cleat is provided with a notch or groove. In order to fix the assembly, a special purpose tool is employed to crimp a portion of the wall of the channel into tight engagement with the notch or groove. The crimper used for this purpose is a very expensive tool, and is nevertheless liable to cause damage to the assembled extrusions which, having been pre-cut to length, prepared and assembled, as a result may have to be discarded and thrown away, which is both wasteful and costly.

It is an object of this invention to provide a corner cleat which enables hollow extrusions to be fixed together without the use of a special purpose tool liable to cause damage to the extrusions.

The Invention

According to one aspect of the present invention, there is provided a corner cleat for fixing together two hollow extrusions which abut at a mitred corner, said cleat having two angled legs respectively to be received in longitudinal channels incorporated in the respective extrusions, wherein each leg of the cleat is formed with a wedge-shaped recess tapering in depth in the longitudinal direction of said leg and a wedging element is provided to cooperate with each said recess and thereby wedge between the tapered surface thereof and a wall of the channel in the extrusion in which the leg is received.

The wedging element preferably comprises a wedge of shape and dimensions substantially matching those of the wedge-shaped recess, said wedge being slidable outwardly of said recess on the tapered surface of the latter.

According to another aspect of the present invention, there is provided a method of fixing together two hollow extrusions which abut at a mitred corner, said cleat having two angled legs to be received in longitudinal channels incorporated in said extrusions, according to which each cleat leg is provided with a wedge-shaped recess extending longitudinally of the leg and containing a wedging element, the two extrusions are assembled with the legs of the cleat extending along and within the respective channels of such extrusions away from the corner, and the wedging element in each leg is displaced along the wedge-shaped recess to wedge between the leg and one wall of the channel in the corresponding extrusion.

In a preferred method the wedging element comprises a wedge which initially matches and fills the wedge-shaped recess, and is displaced by twisting a screwdriver or like tool inserted between the thick end of the wedge and the step in the leg at the deep end of the wedge-shaped recess.

In the Accompanying Drawings

Figure 1 shows in perspective part of a hollow extrusion of a kind typically used in the construction of aluminium window frames and the like;

Figure 2 shows in diagrammatic cross-section a conventional corner cleat in use to fix together two hollow extrusions;

Figure 3 shows in similar manner to Figure 2 a corner cleat in accordance with the invention; and

Figures 4 to 9 are diagrammatic perspective views of various possible differing constructions of corner cleat in accordance with the invention.

Description of Embodiments

Figure 1 shows a typical hollow aluminium extrusion 10 as used in the construction of aluminium framed windows, doors and the like. In use the extrusion is precut to length, and four lengths with mitred corners are assembled to form the frame. At the corners, the sides of the frame are fixed together by means of corner cleats, which are assembled within the hollow extrusions, for example within the longitudinal channel 12 incorporated in the hollow section of the extrusions.

Figure 2 shows a conventional corner cleat 14 fitted within the hollow section of two hollow extrusions 16 and 18 abutting at a mitred corner 20. The cleat 14 has two perpendicular flat legs 22, each of which is formed with a notch or groove 24. A special purpose crimping tool is employed to cut and bend a portion 26 of the wall of the longitudinal channel 28 into tight engagement with the notch or groove 24, thereby to fix the two extrusions 16 and 18 together through the intermediary of the cleat 14. In addition to being expensive in itself, the crimper is liable to damage the extrusions, necessitating rejection and waste of the complete frame.

Figure 3 shows a corner cleat 30 in accordance with the invention, fitted within the hollow section of the two extrusions 16 and 18 in order to fix them together.

Each flat leg 32 of the cleat 30 has a wedge-shaped recess 34 in its exterior major surface 35, the recess having a tapering surface 36 inclined inwardly longitudinally of the leg towards the free end thereof, adjacent which the deep end of the recess 34 terminates with a step 38. Located in each recess is a wedging element in

the form of a wedge 40. The wedge 40 is shaped and dimensioned to be, with a minimum of clearance, a substantially exact fit in the recess 34.

When the two extrusions 16, 18 are assembled with the cleat 30, each wedge 40 is located in its recess 34 so that the external surface 42 of the wedge is substantially flush with the exterior major surface 35 of the leg 32. The cleat 30 is dimensioned so that, at the time of such assembly, there then exists a very small clearance between the leg 32 (and wedge 40) and the extrusion channel 28 in which said leg is located. Then, in order to fix the two extrusions in assembled condition, the operative end of a screwdriver or like tool is inserted between the thick end 44 of the wedge and the step 38 at the deep end of the recess 34, and said tool is twisted to force the wedge 40 up the inclined surface 36 of the recess so that said wedge becomes tightly wedged between said surface and the facing wall, e.g. the slotted front wall 29 (see Figure 1), of the channel 28 in the corresponding extrusion 16 or 18.

Once tightly wedged in position in this manner, it is substantially impossible to "unlock" the cleat due to the high frictional forces which arise. However, a locking means such as a fixing screw, or more simply a sprung V-clip inserted into the gap opened up between the wedge 40 and the step 38, may be used positively to lock the wedge in its wedging position.

It will be appreciated that the assembly is fixed without the use of any special purpose tool such as a crimper, and that risk of damage to the precut, prepared and assembled extrusions is substantially avoided.

Figure 4 shows the cleat 30 of Figure 3 in diagrammatic perspective view, the same reference numerals being employed.

Figure 5 shows a modification in which the recess 50 and wedge 52 are reversed in the longitudinal direction of each leg 54 of the cleat 56, i.e. the deeper end of the recess 50 is nearer the corner of the cleat. This can be advantageous to minimise risk of unlocking of the wedge under some circumstances. Depending on the forces which may be applied to the frame in use, the recess and wedge will be orientated so that these forces tend to tighten the wedging action and do not act to urge the wedge down the inclined surface of the tapered recess.

Figure 6 shows a modification in which the recess 60 and wedge 62 are located on the interior major surfaces 64 of each leg 66 of the cleat 68. In practice, the recess and wedge cooperating therewith will be provided on that major surface of the cleat which is accessible or more readily accessible (with a screwdriver head) through an open side or slot in the longitudinal channel in the extrusion within which the cleat is located. Only limited access is required, and it is possible in accordance with the invention to locate the cleat within a longitudinal channel in the extrusion which is of closed cross-section except for a short access slot purposely provided in one channel wall at the region where insertion of a screwdriver head is necessary in order to wedge the cleat.

Figure 7 shows, in an analogous modification to Figure 4, a cleat 70 having the wedges 72 on the interior major surfaces 74 of the cleat legs 76 arranged with their thicker ends nearer the corner of the cleat, the recesses 78 being shaped and dimensioned accordingly.

Finally, Figures 8 and 9 show alternative constructions employing opposed wedge pairs at each leg of the cleat. In Figure 8, each pair of wedges 80 cooperates with a shallow V-recess 82 in each leg 84 of the cleat 86, said recess 82 being provided on an internal major surface 88 of each leg. In Figure 9, each pair of wedges 90 cooperates with a shallow V-recess 92 in each leg 94 of the cleat 96, said recess 92 being provided on an external major surface 98 of each leg. A double wedging action is obtained at each cleat leg with the arrangements of Figures 8 and 9, and such arrangements can advantageously be employed to provide increased resistance to loosening of the fixed together extrusions when a window frame or door is liable to be subjected to abrupt stresses or shocks in use.

It will be appreciated that various other modifications are practicable in accordance with the invention, including arrangements for special purpose window, door or like frames which require differing wedge arrangements on the two legs of a single cleat, e.g. one interior and one exterior wedge, arrangements in which the legs of the cleat are arranged at an angle other than a right angle, and arrangements employing wedging elements of differing form and construction to the wedges illustrated in the drawings.

CLAIMS

1. A corner cleat for fixing together two hollow extrusions which abut at a mitred corner, said cleat having two angled legs respectively to be received in longitudinal channels incorporated in the respective extrusions, wherein each leg of the cleat is formed with a wedge-shaped recess tapering in depth in the longitudinal direction of said leg and a wedging element is provided to cooperate with each said recess and thereby wedge between the tapered surface thereof and a wall of the channel in the extrusion in which the leg is received.

2. A corner cleat according to claim 1, wherein the wedging element comprises a wedge of shape and dimensions substantially matching those of the wedge-shaped recess, said wedge being slidable outwardly of said recess on the tapered surface of the latter.

3. A corner cleat according to claim 1 or claim 2, wherein the cleat has two flat legs lying in angled planes, each leg having a wedge-shaped recess formed in one of its major surfaces.

4. A corner cleat according to claim 3, wherein the recessed major surface is on the interior angle of the cleat.

5. A corner cleat according to claim 3, wherein

the recessed major surface is on the exterior angle of the cleat.

6. A corner cleat according to any of claims 1 to 5, wherein the wedge-shaped recess deepens towards the free end of at least one of the legs.

7. A corner cleat according to any of claims 1 to 6, wherein the wedge-shaped recess deepens away from the free end of at least one of the legs.

8. A corner cleat according to any one of claims 1 to 7, wherein the legs are mutually perpendicular for fixing two extrusions meeting at a mitred right-angled corner.

9. A corner cleat according to claim 2 or any of claims 3 to 8 when appendant to claim 2, including a locking element for locking the wedging element in a displaced position outwardly of the recess.

10. A corner cleat according to claim 9, wherein said locking element is a sprung stop adapted to fit between the thick end of the wedge and the step in the leg at the deeper end of the wedge-shaped recess.

11. A method of fixing together two hollow extrusions which abut at a mitred corner, said cleat having two angled legs to be received in longitudinal channels incorporated in extrusions, according to which each cleat leg is provided with a wedge-shaped recess extending longitudinally of the leg and containing a wedging element, the two extrusions are assembled with the legs of the cleat extending along and within the respective channels of such extrusions away from the corner, and the wedging element in each leg is displaced along the wedge-shaped recess to wedge between the leg and one wall of the channel in the corresponding extrusion.

12. A method according to claim 11, wherein the wedging element comprises a wedge which initially matches and fills the wedge-shaped recess, and is displaced by twisting a screwdriver or like tool inserted between the thick end of the wedge and the step in the leg at the deep end of the wedge-shaped recess.

13. A method according to claim 11 or claim 12, applied to the fixing together of two aluminium extrusions forming part of a window frame, window, door or door frame.

14. A corner cleat substantially as hereinbefore described with reference to the accompanying drawings.

15. A method of fixing together two hollow extrusions substantially as hereinbefore described.

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